

PermaRail Plus™ Level Rail Installation Instructions

1-Piece Standard Top Rail System

PermaRail Plus™ – Level Rail Installation Instructions for 1-Piece “Standard” Top Rail System

NOTE: “STANDARD” RAIL MAY BE USED AS A STAND ALONE RAIL SYSTEM UP TO 8’ LONG

It is recommended that you check all local, state & national building codes before the design & installation of your PermaRail Plus™ railing system. The manufacturer is not responsible or liable for any rail system that does not meet the requirements of the governing building code in the location where the system is installed.

1. PREPARE TO MEASURE RAIL SECTION LENGTHS

A. Before taking measurement, make sure that the newel posts or columns to which the railings will be attached are plumb & secure.

I. If using HB&G PVC newel sleeves & Newel-Loc™ structural post mounts, install following the installation instructions that came with each post mount. If using 4x4 treated wooden newel posts with HB&G PVC newel sleeves, be sure that 4x4 posts have been installed in accordance with your local building code. Cut PVC newel sleeve to final length & slide the newel sleeve over the 4x4 treated wooden post. See Table #1 below for component heights, including newel sleeves (*refer to newel sleeve installation instructions*).

Table 1: Baluster, Support Block, & Newel Sleeve Heights

International Residential Code (IRC) Single Family, Duplexes, Townhouses - Maximum 3 Stories High				
Rail Name	Baluster Length	Support Block Height	Overall Rail Height	Suggested Newel Sleeve Length
Standard	30"	3½"	36¼"	39½"
Newport		3½"	37¼"	40½"
Savannah		3½"	37¼"	40½"
Belhaven		3½"	36¾"	40½"

International Building Code (IBC) Apartments with ≥ 3 Units, All Commercial Buildings				
Rail Name	Baluster Length	Support Block Height	Overall Rail Height	Newel Sleeve Length
Standard	36"	3½"	42¼"	45"
Newport		2¼"	43¾"	45"
Savannah		2¼"	42½"	45"
Belhaven		2¼"	42½"	45"

II. If using PVC column wraps such as PermaWrap®, RigidWrap®, or PermaSnap™, be sure supplemental rail attachment blocking has been added to the structural post inside the PVC column wraps at the rail attachment points.

III. If using thin-wall pultruded fiberglass columns such as PermaLite®, add 2x4 or 2x6 pressure treated blocking to the inside faces of the column at the rail attachment points.

IV. FRP fiberglass columns, such as PermaCast®, do not require supplemental blocking. **VERY IMPORTANT – USE 13/64" DIAMETER DRILL BIT TO DRILL THE HOLES IN FRP COLUMNS TO RECEIVE THE RAIL ATTACHMENT BRACKET SCREWS!**

2. MEASURE & CUT RAIL SECTIONS & ALUMINUM RAIL STIFFENERS TO LENGTH

A. Measure length (span) of top & bottom rail sections. Be sure to take separate measurements at the top & bottom rail locations. **Your newel posts should be plumb when taking these measurements.**

B. Cut PVC rail sections to lengths you measured using a power miter box with fine tooth carbide blade. **Test fit each piece! The pieces must slide into place without binding or the ends could be damaged if they have to be forced into position. Be sure your newel posts are plumb when test fitting the rails.**

C. Cut top & bottom U-shaped aluminum stiffeners ¾" shorter than PVC rail sections.

3. LAY OUT THE BALUSTER SPACING

NOTE: Start layout from the center of the rail section & work towards each end.

A. For **Simplified Baluster Spacing** (with variable spacing at the ends of the rail section that does not equal the spacing between the balusters), use the following procedure to determine your layout:

I. Add the baluster thickness plus code-compliant spacing. Suggested spacing for 1¼" balusters is 37/8" & suggested spacing for 1½" balusters is 3¾". **NOTE: Check local building codes for maximum allowed spacing.**

1. For 1¼" thick balusters, this totals 1¼" + 37/8" = 51/8" baluster spacing on center.

2. For 1½" thick balusters, this totals 1½" + 3¾" = 5¼" baluster spacing on center.

B. For **Equal Baluster Spacing** (all spaces between balusters & spacing at the ends of the rail section are equal), you can use the following procedure to determine the spacing of the balusters. **NOTE: Check local building codes for maximum allowed spacing.**

I. Note the measurement of the rail section length.

1. If you are using 1¼" wide balusters, divide the rail section length by 5.125

2. If you are using 1½" wide balusters, divide the rail section length by 5.25

II. Divide the rail section length by the appropriate number (5.125 or 5.25) from the previous step that corresponds to the thickness of your balusters. As an example, if the overall length of the rail is 89.5" & 1¼" wide balusters are being used, $89.5 / 5.125 = 17.46$

III. Round the value you obtained up to the nearest whole number. In this example, 17.46 rounds up to 18. This is the number of spaces you will have in this rail section. You will have one more space than balusters, so in this example, you will have 17 balusters. **NOTE: An odd number of balusters results in a baluster in the center of your rail section. An even number of balusters results in a space in the center.**

IV. Multiply 17 by the width of one baluster (in this example, 1¼"). $17 \times 1.25 = 21.25"$. This is the sum total width of the 17 balusters.

V. Subtract 21.25" from the length of the rail section. $(89.5 - 21.25 = 68.25"$). This is the sum total width of the 18 spaces.

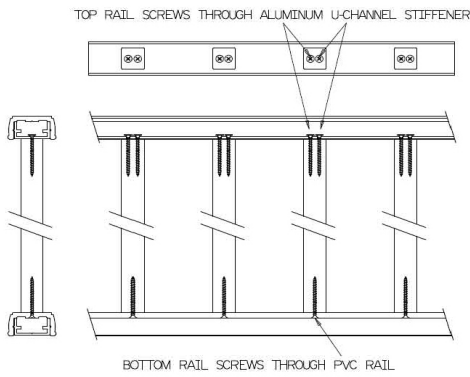
VI. Divide 68.25 by 18 to determine the width of each space: $68.25 / 18 = 3.79$. Round this number up to the nearest 1/16 inch. In this case, that number is 3.8125 or 313/16". This is the width of the spaces between the balusters & the approximate width of the spaces at each end of the rail section. **NOTE: When rounding up to the nearest 1/16", the width of the spaces at each end of the rail will be slightly less than the spacing between the balusters, but this will not be noticeable.**

C. Each baluster will receive three #8 X 2½" screws: **(see Drawing 1)**

I. One screw through the bottom PVC Standard rail into the center of the baluster

II. Two screws through the top U-shaped aluminum stiffener into the baluster, ¼" off of center in each direction.

Drawing 1: "STANDARD" RAIL BALUSTER SCREW LAYOUT



4. SET UP ASSEMBLY STATION & SCREW BALUSTERS TO BOTTOM RAIL / TOP STIFFENER

A. It is recommended to devise a temporary assembly station to make the assembly process quick & accurate. A 4x8 sheet of plywood across a pair of saw horses or workbench works well as temporary assembly table.

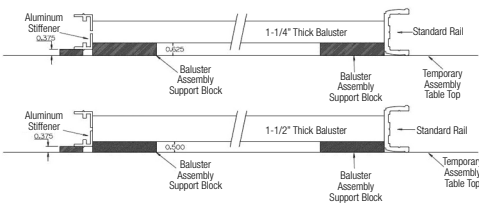
I. If you are using 1 1/4" thick balusters, cut 2 baluster assembly support blocks that are approximately 3 1/2" wide & 5/8" thick. If you are using 1 1/2" thick balusters, cut 2 baluster assembly support blocks that are approximately 3 1/2" wide & 1/2" thick. You will also need 3/8" thick support blocks under the aluminum stiffener.

(See Drawings 2, 3A & 3B)

Drawing 2: TEMPORARY ASSEMBLY STATION



Drawing 3A: TEMPORARY ASSEMBLY STATION SETUP

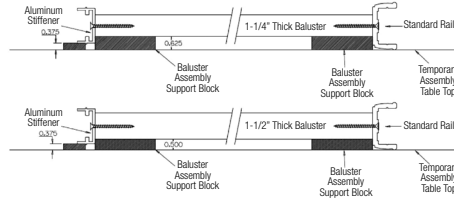


B. Use the #8 X 2 1/2" square-drive screws to fasten the balusters to the rail sections. You must pre-drill 3/16" diameter holes in the aluminum stiffener. It is also helpful, though not necessary, to lay out & pre-drill 1/8" diameter holes for the screws in the PVC rail section. As noted in **Step 3C**, one screw should be used to fasten the bottom PVC rail to each baluster & 2 screws fasten the top aluminum stiffener to each baluster.

IMPORTANT: You will need to countersink the screw holes in the aluminum stiffener over the last baluster at each end so the heads of the baluster screws sit flush with the bottom of the U-shaped aluminum stiffener. This is necessary so the rail mounting brackets can slide into place over the screw heads.

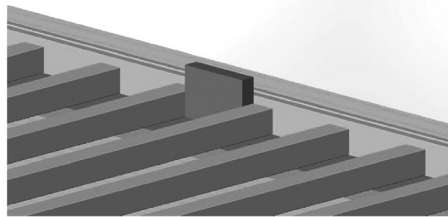
For an odd number of balusters, start by installing a baluster at the center of the rail. For an even number of balusters, start by installing one of the 2 balusters that will be closest to the center of the rail.

Drawing 3B: SCREW BALUSTERS TO TOP STIFFENER & BOTTOM STANDARD RAIL



C. Cut a spacer block out of scrap material, exactly the width of the space that will be between two balusters. (See Drawing 4) After installing your first baluster at the center of the rail (for an odd number of balusters) or next to the center space (for an even number of balusters), press the spacer block against one side of that baluster & put the next baluster in place, tight against the other end of the spacer block. Do this at the top and bottom of the baluster. Screw the baluster in place. Repeat this process for all remaining balusters. Check your spacing with a tape measure periodically to make sure your spacing is correct & make any necessary adjustments. The installation of the balusters is complete. (See Drawing 5)

Drawing 4: BALUSTER SPACER BLOCK



Drawing 5: BALUSTER INSTALLATION COMPLETE



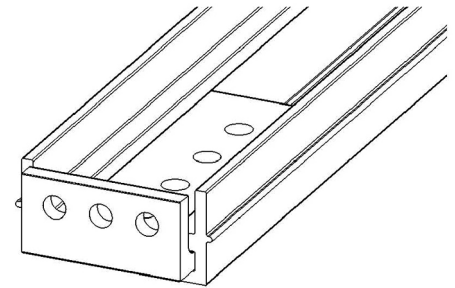
5. INSERT LEVEL-LOC™ RAIL ATTACHMENT BRACKETS INTO BOTTOM ALUMINUM STIFFENER

LEVEL RAIL MOUNTING HARDWARE KIT



A. Take the U-shaped aluminum stiffener that you cut for the bottom rail section in step 2C & slide one of the Level-Loc™ rail attachment brackets into each end. Slide the long leg of the bracket into the slot provided in the aluminum stiffener. (See drawing 6) The legs of the U-shaped stiffener should point up & the short leg of the level rail mounting bracket should also be pointing up.

Drawing 6: U-SHAPED ALUMINUM STIFFENER WITH LEVEL-LOC™ RAIL MOUNTING BRACKET

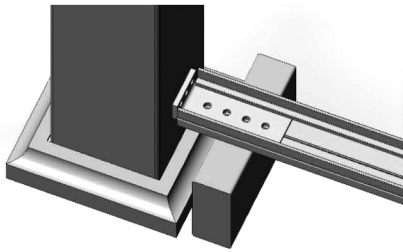


6. INSTALL BOTTOM STIFFENER & LEVEL-LOC™ RAIL ATTACHMENT BRACKETS

NOTE: The rail section will be installed in between 2 newel posts, walls, columns, full height posts, or some combination of these components. For this example, we will illustrate a rail section being installed between 2 newel posts.

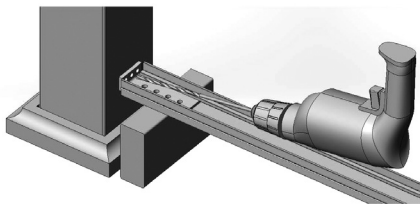
A. Depending on which rail style & height you are using, your bottom rail will be either 3 1/2" or 2 3/4" above the floor (See Table 1). Cut two temporary blocks (pieces of 2x4 work well) the appropriate height & place them next to each post so you can rest the aluminum stiffener on top of the blocks. Once resting on the blocks, check your aluminum stiffener for level. If it is not level, cut a shorter temporary support block for the end that is high to make the stiffener level. (See Drawing 7)

Drawing 7: ALUMINUM STIFFENER RESTING ON 2X4 BLOCK



B. Center the aluminum stiffener (with the inserted brackets) on the face of the newel. Use a 12" long $\frac{3}{16}$ " diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the $\frac{1}{4}$ " diameter hex head screws at each end of the rail. Drill through all 3 holes in the vertical leg of each Level-Loc™ rail bracket. **IMPORTANT: The 12" long bit is necessary to drill the holes at a shallow angle or horizontally (See Drawing 8).**

Drawing 8: DRILL PILOT HOLES WITH 12" LONG DRILL BIT

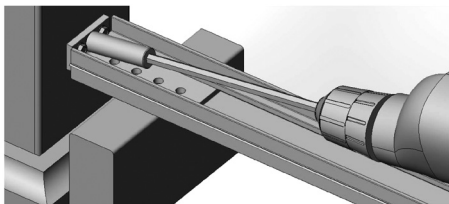


C. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a $\frac{3}{8}$ " hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (See Drawing 9)

i. IF USING THE HB&G STEEL NEWEL-LOC™ NEWEL MOUNT SYSTEM, USE THE $\frac{1}{4}$ " LONG HEX HEAD SCREWS.

ii. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

Drawing 9: DRIVE HEX HEAD SCREWS INTO NEWEL POST

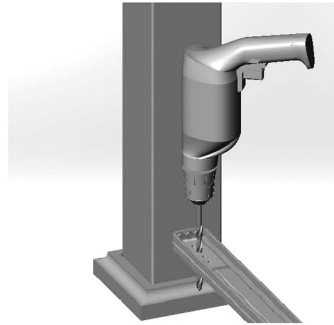


D. Remove the temporary 2x4 support blocks at each end of the aluminum stiffener.

E. Using one of the 4 holes in the long leg of the rail attachment bracket, you are now going to drill 1 hole through the aluminum stiffener at each end of the rail. Any one of the holes can be used, but the 3rd or 4th hole will be easiest to use. Take a $\frac{9}{32}$ " drill bit &

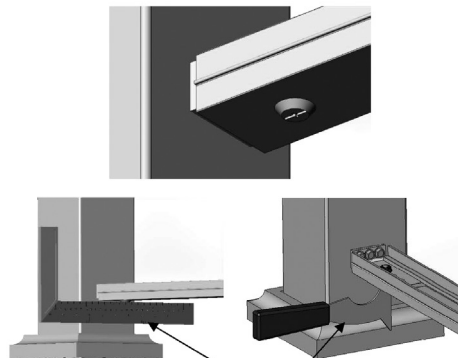
use the hole you've chosen in the Level-Loc™ bracket as a guide to drill through the aluminum stiffener. (See Drawing 10)

Drawing 10: DRILL HOLE FOR LEVEL-LOC™ BRACKET MOUNTING-BOLT HOLE THROUGH ALUMINUM STIFFENER

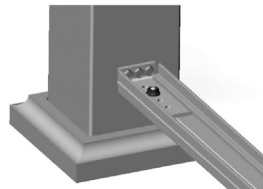


F. Insert one of the $\frac{1}{4}$ " X $\frac{3}{4}$ " sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN THIS STEP FOR THE BOTTOM RAIL SECTION, BE SURE TO USE THE $\frac{3}{4}$ "-LONG BOLTS. DO NOT USE THE 1"-LONG BOLTS.** Use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten a $\frac{1}{4}$ " lock-nut onto the bolt with a $\frac{7}{16}$ " wrench or driver bit. (See Drawings 11A – 11D)

Drawings 11A, 11B, 11C, & 11D: INSTALL SIDEWALK BOLTS



Tri-square can be used if blade is thin enough or use stiff putty knife to hold bolt while installing & tightening nut



G. Install the $1\frac{1}{4}$ " square PVC support blocks. The number of support blocks required will depend on the length of rail. The maximum unsupported span is 44". Depending on which rail style & height you are using, your support blocks will need to be either $3\frac{1}{2}$ " or $2\frac{3}{4}$ " long (see Table 1). The blocks that come with the kit are $3\frac{1}{2}$ " long. If your rail requires $2\frac{3}{4}$ " long support blocks, cut the $3\frac{1}{2}$ " blocks to that length.

- i. 6' rail = 1 support block
- ii. 8' rail = 2 support blocks
- iii. 10' rail = 2 support blocks
- iv. 12' rail = 3 support blocks

Determine the location of the support blocks by taking the PVC rail section you assembled (shown in Drawing 5) & holding it in place to locate the support blocks directly under balusters in the rail section. After marking the support locations, set the rail section aside & drill a hole through the center of the bottom aluminum stiffener with a $\frac{3}{16}$ " drill bit at each support block location, but do not drill into the support blocks. After drilling the holes for each support block, place them in position & while grasping each the support block with one hand, drive a #8 X $2\frac{1}{2}$ " long stainless steel flat head screw directly into the center of each support block. (See Drawings 12A & 12B)

Drawings 12A & 12B: INSTALL SUPPORT BLOCKS

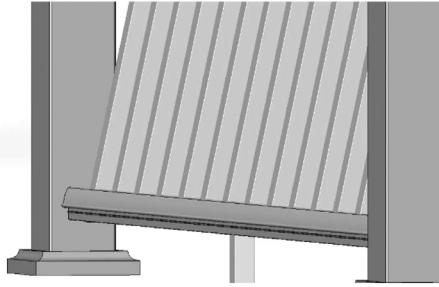
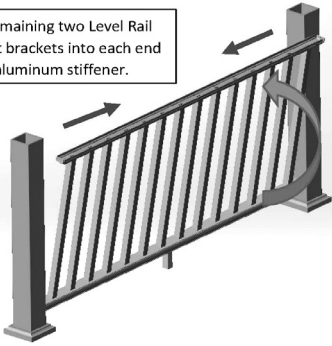


7. INSERT & INSTALL ASSEMBLED RAIL SECTION

A. Now you are ready to insert & snap into place the rail section you pre-assembled in steps 1 through 4. Verify that the length of the top U-shaped aluminum stiffener & bottom PVC rail are the correct lengths to fit closely between the support components (newels, columns, posts, or wall). Slide the 2 remaining Level-Loc™ rail attachment brackets into each end of the top aluminum stiffener. **NOTE: Be sure the decorative newel caps are removed for easier installation of the rail section.** Take the pre-assembled rail section & tilt it at a slight angle as you slide the bottom PVC rail into place & hook it over the bottom aluminum stiffener. (See Drawings 13A & 13B)

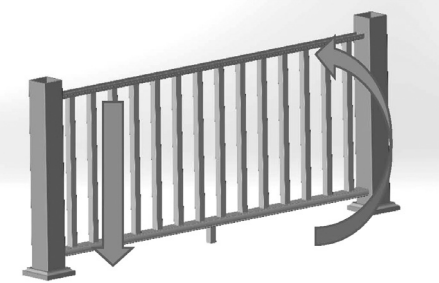
Drawings 13A & 13B: SLIDE LEVEL RAIL ATTACHMENT BRACKETS INTO STIFFENER & TILT PRE-ASSEMBLED RAIL SECTION & SLIDE INTO PLACE

Slide the remaining two Level Rail attachment brackets into each end of the top aluminum stiffener.



B. Continue tilting the rail section into place until it is vertical. After the rail section is vertical, press firmly on the top rail to snap the bottom rail into place over the bottom aluminum U-shaped stiffener. (See Drawings 14A & 14B)

Drawings 14A & 14B: RAIL SECTION TILTED INTO VERTICAL POSITION & BOTTOM PVC RAIL FULLY SNAPPED INTO PLACE OVER BOTTOM ALUMINUM STIFFENER



Bottom PVC rail snapped into place over bottom aluminum stiffener

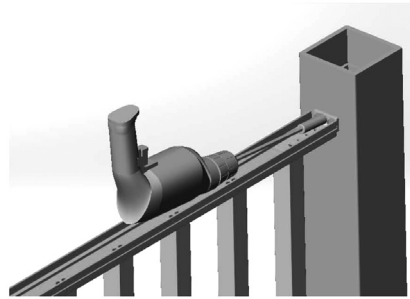
C. Center the top rail aluminum stiffener (with the inserted brackets) on the face of the newel. Use a 12" long, $\frac{3}{16}$ " diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the $\frac{1}{4}$ " diameter hex head screws at each end of the rail. Drill through all 3 holes in the vertical leg of each mounting bracket. **IMPORTANT: The 12" long bit is necessary to drill the holes at a shallow angle or horizontally (See Drawing 15A).**

D. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a $\frac{3}{8}$ " hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (See Drawing 15B)

I. IF USING THE HB&G STEEL NEWEL-LOC™ NEWEL MOUNT SYSTEM, USE THE $\frac{1}{4}$ " LONG HEX HEAD SCREWS.

II. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

Drawings 15A & 15B: DRILL PILOT HOLES WITH LONG DRILL BIT & DRIVE HEX HEAD SCREWS INTO NEWEL POST WITH EXTENDED DRIVER BIT.



E. After securing the Level-Loc™ rail attachment brackets to the post, choose one of the 4 holes in the long leg of the rail attachment bracket that does not interfere with the last baluster. Take a $\frac{9}{32}$ " drill bit & use that hole as a guide to drill 1 hole through the U-shaped aluminum stiffener. Repeat at the other end of the rail. (See Drawing 16)

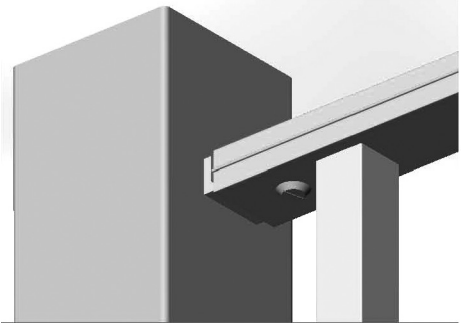
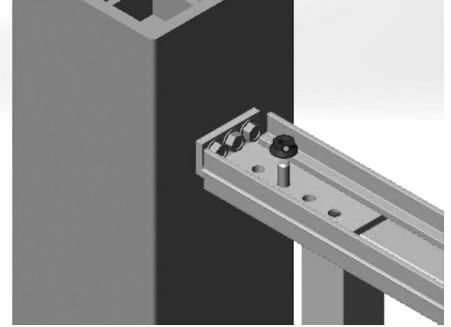
Drawing 16 – DRILL SIDEWALK BOLT HOLES IN TOP RAIL



F. Insert one of the $\frac{1}{4}$ " X 1" sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN**

THIS STEP FOR THE UPPER RAIL SECTION, BE SURE TO USE THE 1"-LONG BOLTS. DO NOT USE THE 3/4"-LONG BOLTS. Refer back to Drawings 11B & 11C & use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten a $\frac{1}{4}$ " lock-nut onto the bolt with a $\frac{7}{16}$ " wrench or driver bit. (See Drawings 17A & 17B)

Drawings 17A & 17B: INSERT & FASTEN SIDEWALK BOLTS TO SECURE TOP RAIL ATTACHMENT BRACKETS

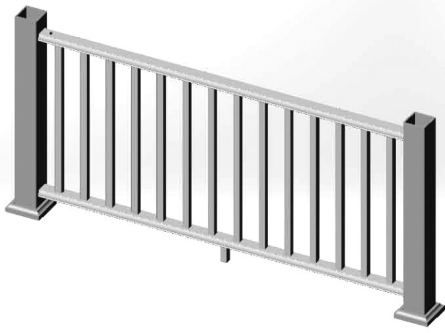


G. Drop the top "Standard" PVC rail, with the legs pointing down, into place over the top U-shaped aluminum stiffener. Once in position, snap the PVC rail down into place. **NOTE: The small ridges on the outside of the aluminum stiffener legs running the length of the stiffener should snap into the shallow grooves running the length of the PVC rail, on the inside faces of the PVC rail legs. (See Drawings 18A & 18B)**

Drawing 18A: DROP "STANDARD" TOP PVC RAIL INTO PLACE



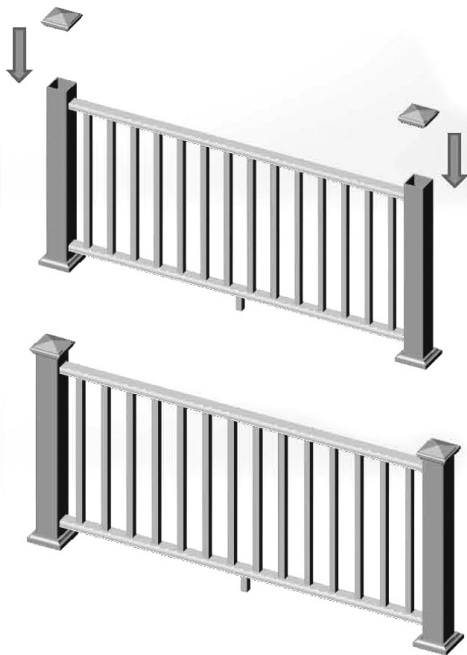
Drawing 18B: SNAP "STANDARD" PVC TOP RAIL INTO POSITION



H. Install the newel post caps by pushing them into place on the top of each newel post

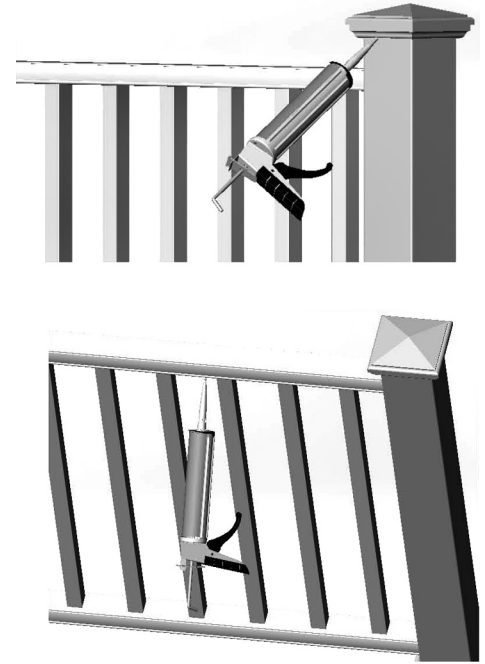
(See Drawings 19A & 19B).

Drawings 19A & 19B: INSTALL NEWEL POST CAPS




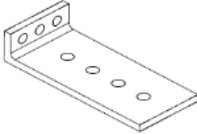










I. There will be a very narrow gap where the legs of the top rail snap into place over the upper U-shaped aluminum stiffener & also along the bottom edge of the newel post cap where it meets the newel post. Use the provided Siroflex adhesive caulk to bond the "Standard" PVC top rail to the upper U-shaped aluminum stiffener, & to bond the newel post caps to the newel posts. Caulk the entire length of the top rail on both sides. Caulk around the entire edge under each newel post cap. Wipe the caulk with your finger while at the same time pushing the caulk into the gaps. Wipe any excess caulk off the rail & newel posts with a damp rag. Repeat the cleaning process if necessary so the only caulk visible is the caulk that is up in the narrow gaps **(See Drawings 20A & 20B).**

Drawings 20A & 20B: CAULK NEWEL CAPS & RAIL



YOUR RAILING IS COMPLETE

RAIL KIT ITEM		QUANTITY PER KIT			
		6'	8'	10'	12'
"Standard" Rail		2	2	2	2
Top & Bottom U-shaped Aluminum Stiffener		2	2	2	2
Supplemental Aluminum I-Beam Stiffener		N/A	N/A	1	1
Level-Loc™ Level Rail Attachment Brackets		4	4	4	4
Baluster 1-1/4" Square		13	18	23	28
Support Block 1-1/4" x 3-1/2"		1	2	2	3
1/4" x 2" Hex Head Rail Bracket Attachment Screws		12	12	12	12
1/4" x 1-1/4" Hex Head Rail Bracket Attachment Screws		12	12	12	12
1/4" x 3/4" Sidewalk Bolt		2	2	2	2
1/4" x 1" Sidewalk Bolt		2	2	2	2
1/4" Nylon Insert Lock Nut		4	4	4	4
#8x2-1/2" Flat Head Square Drive Baluster Screws		43	60	82	86

TOOLS & SUPPLIES NEEDED FOR INSTALLATION		USE
Necessary	Power Miter Box	Cut rail components & aluminum stiffeners
Necessary	Cordless Drill	Drill holes, drive fasteners
Recommended	Cordless Impact Driver	Drive fasteners
Necessary	Hammer	Various
Necessary	Caulking Gun	Apply caulk to 2-piece top rail
Necessary	Utility Knife	Various
Necessary	7/16" Wrench	Tighten locknuts for sidewalk bolts
Necessary	5-in-1 "Painters Tool" Putty Knife	Hold sidewalk bolts while driving locknuts
Necessary	Try-square or Combination Square	Mark rails for cutting
Necessary	Magnetic Driver Bit Holder	Drive various fasteners
Necessary	12" Long Magnetic Driver Bit Holder	Drive rail mounting bracket hex head screws
Necessary	3/8" Hex Driver Bit	Drive rail mounting bracket hex head screws
Necessary	#2 Driver Bit for Square Drive Screw	Drive baluster screws
Recommended	7/16" Impact Driver Socket & Impact Driver Socket Adapter	Drive locknuts for sidewalk bolts instead of using 7/16" wrench
Necessary	1/8" Twist Drill Bit	Pilot holes for baluster screws
Necessary	13/64" Twist Drill Bit	Pilot holes for rail mounting bracket hex head screws being driven into FRP columns
Necessary	9/32" Twist Drill Bit	Holes through rail and aluminum rail stiffener for sidewalk bolts
Necessary	3/16" x 12" Long Twist Drill "Aircraft Bit"	Pilot holes for rail mounting bracket hex head screws.
Necessary	3/16" Twist Drill Bit	Pilot holes through aluminum rail stiffeners for baluster screws
Necessary	Rags	Cleanup caulk squeeze out
Necessary	Bucket	Cleanup caulk squeeze out
Necessary	Water for Cleanup	Cleanup caulk squeeze out
Recommended	Denatured Alcohol for Cleanup	Clean pencil marks and others from installation